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# **The Economic Impact of the Smoking Ordinance on Restaurant Sales in Houston, Texas**

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# EXECUTIVE SUMMARY

## *Background*

In March of 2005, the City of Houston passed an ordinance prohibiting smoking in restaurants and limiting smoking in a number of other public spaces, including restaurant bars. As part of this ordinance, the city council passed an amendment requiring an independent third-party evaluation of the ordinance's economic impact 18 months after its passage. The City of Houston contracted with MGT of America to prepare this evaluation. They also asked MGT to evaluate the economic impact of a similar ordinance passed in Dallas in order to determine the longer-term effects of smoking ordinances.

Over the past 20 years, numerous states and localities have passed smoking control laws to limit smoking in work and public spaces. Across the U.S., more than 44 percent of the population is covered by 100% smoke-free provisions in workplaces, restaurants, bars or some combination thereof. While most of these bans have been passed by municipalities, 17 states also have passed laws that limit smoking to some degree.

In Texas, which has no statewide smoking control law, more than 220 municipalities have passed ordinances limiting smoking in some way. All of the state's 20 largest cities have passed some type of smoking restriction for at least one setting.

The cities with the most comprehensive bans are El Paso, Austin, Laredo, and Beaumont. Amarillo, Pasadena, and Mesquite have the least coverage and/or the least restrictive smoking ordinances. Houston's smoking ordinance is considered to be of the least restrictive because of the exception areas in which smoking is permitted. Dallas, on the other hand, is considered to be more restrictive because it has designated municipal worksites, restaurants and bars in restaurants as smoke-free.

The Dallas and Houston ordinances are similar in that smoking generally is prohibited in restaurants and allowed in bars. The two ordinances differ, however, in the restrictions placed on restaurant bars as well as in the number and type of exceptions to the ban.

Past studies of the economic impact of smoking have varied based on the sponsoring parties' support for or opposition to smoking control laws. Studies sponsored by public health agencies and professionals tend to find that smoking ordinances have no economic impact on restaurants, while those sponsored by the restaurant or tobacco industries tend to find negative effects.

These studies use differing methodologies. Studies sponsored by public health authorities generally focus on the restaurant industry as a whole, while the restaurant and tobacco industries prefer studies focusing on individual restaurants or restaurant types. While the results of these competing studies seem contradictory, they may not be. Individual restaurant revenues may be affected in different ways – some positively and some negatively – while aggregated revenues remain unchanged.

### ***Methods***

To better understand the restaurant sectors in Dallas and Houston, MGT first analyzed the performance of the two cities' restaurant industries over the ten years prior to implementation of the ordinances.

Next, to examine the economic impact of the ordinances in Houston and Dallas both at the aggregate level and by restaurant type, MGT analyzed municipal sales tax data for "Eating Places" and "Eating and Drinking Places," and municipal mixed beverage sales data for "Full-Service Restaurants" and "Drinking Places."

Standard Industrial Classification (SIC) codes define Eating Places (SIC 5812) as restaurants that do not sell alcohol and Eating and Drinking Places as restaurants that sell beer and wine (SIC 5816) or restaurants that sell alcoholic beverages (SIC 5817). The North American Industry Classification System (NAICS) defines Full-Service Restaurants (NAICS 722110) as establishments primarily engaged in providing food services to patrons who order and are served while seated, and Drinking Places (NAICS 722410) as establishments primarily engaged in preparing and serving alcoholic beverages for immediate consumption.

For all Dallas sales and for Houston mixed beverage sales, MGT employed multivariate regression analysis to estimate the impact of the smoking ordinance. For Houston's restaurant sales, MGT used an adaptive forecasting technique to impute what restaurant sales would have been from 2005 onward had they followed past patterns. Actual sales figures were plotted against the forecast to estimate whether sales were higher or lower than they would have been otherwise.

### ***Results and Conclusions***

The Houston and Dallas smoking ordinances do not carry adverse outcomes for the restaurant sector in aggregate. The smoking ordinance in Dallas is associated with somewhat less favorable sales for Eating and Drinking Establishments than for Eating Establishments, although the results were statistically insignificant.

## *Executive Summary*

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The smoking ordinance in Dallas is associated with declines in mixed beverage sales in Full-Service Restaurants, although this trend is not replicated in Houston. The results of the analysis on mixed beverage sales in Houston showed no adverse economic outcomes associated with the smoking ordinance for any of the groups of establishments studied.

## BACKGROUND

### *Project Overview*

On March 9, 2005, the City of Houston passed an amendment to its Code of Ordinances concerning smoking in public places. The ordinance, which went into effect on September 5, 2005, generally prohibits smoking in public places and large multi-tenant buildings, making exceptions for a number of specific areas.

These areas include taxicabs, hotel and motel rooms, certain hospital and nursing home rooms, restaurant and lounge bars, tobacco specialty shops, convention center exhibition areas, lobbies and waiting rooms, rooms or halls used for private functions, stadium hospitality suites and separate, enclosed individual workspaces.

The ordinance specifies that smoking areas must be separate and enclosed, or located near the exhaust system of an enclosed area so that smoke is not drawn into non-smoking areas. As a result, all Houston restaurants other than restaurant bars and rooms used for private functions are 100% smoke-free.

Due to the continuing debate over the economic impact of similar smoking ordinances, Houston's ordinance included a provision requiring that an independent third party conduct a study of its economic impact on restaurant sales. This study is to be presented to the City Council within 18 months of the passage of the ordinance.

To comply with this provision, the City of Houston contracted with MGT of America to conduct the study. Because the ordinance had been in place for less than a year before the study began, the city asked MGT to estimate the economic impact of the City of Dallas' three-year-old smoking ordinance, to consider the longer-term effects of such bans.

Dallas implemented its smoking control ordinance on March 1, 2003. Like Houston's, the Dallas ordinance prohibits smoking in restaurants and permits it in designated areas in bars. The Dallas ordinance is more restrictive than Houston's, however, in that it contains fewer smoking areas. In particular, smoking is not permitted in Dallas restaurant bars.

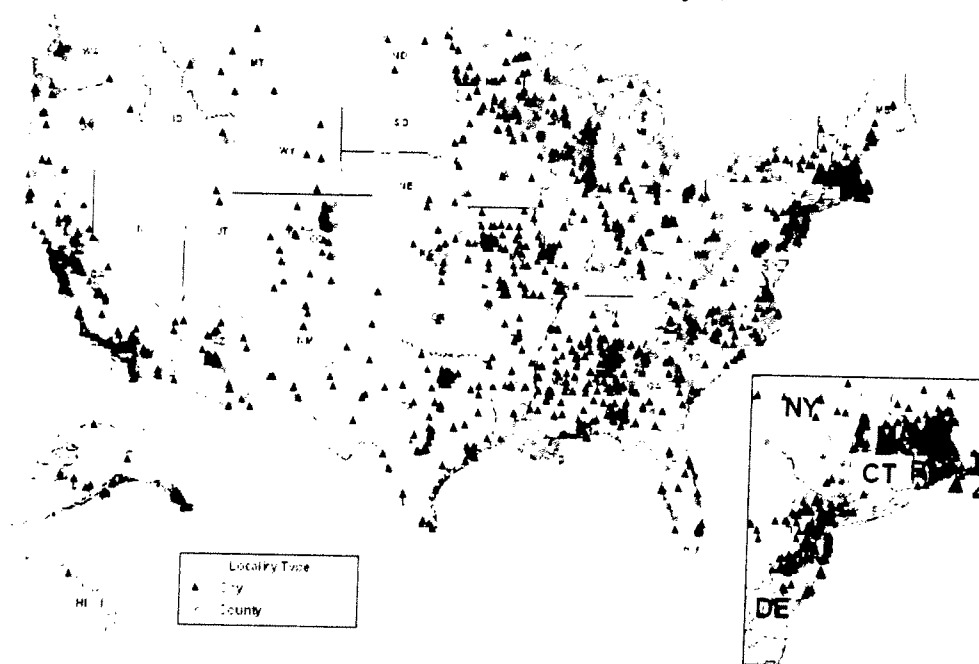
### *Rising Popularity of Smoking Control Ordinances*

In the past 20 years, public sentiment favoring smoke-free work and public places has gained considerable momentum. Many cities and even some states across the U.S. have passed ordinances limiting smoking in varying degrees. Since 1985, the number of state and local laws limiting smoking has risen from 200 to more than 2,000. More than 44 percent of the U.S.

population currently resides in areas covered by 100% smoke-free provisions applicable to workplaces, restaurants and bars in various combinations (**Exhibit 1**).<sup>1</sup>

In addition to the localities mapped in **Exhibit 1**, 17 states have passed laws limiting smoking to some degree, including California, Colorado, Connecticut, Delaware, Florida, Idaho, Maine, Massachusetts, Montana, New Jersey, New York, North Dakota, Rhode Island, South Dakota, Utah, Vermont and Washington.<sup>2</sup>

**Exhibit 1**  
**Local Smoking Control Laws as of July 1, 2006\***



\* Laws shown are those that restrict smoking to any extent.  
Note: some laws shown are not yet in effect.  
Source: ANR Foundation, *Local Tobacco Control Ordinance Database*.

Many Texas cities have enacted smoking ordinances in the absence of a statewide law. The Texas Smoke-Free Ordinance Database, created by the University of Houston Health Network for Evaluation and Training Systems, lists all known Texas municipal ordinances designed to restrict exposure to second-hand smoke.

Of the 241 Texas municipalities included in this database, most support smoke-free municipal worksites and more than half have limited smoking in restaurants.<sup>3</sup> Few, however, have limited smoking in bars. Ninety-three percent of the municipalities have laws that limit smoking

at municipal worksites and 55 percent limit smoking in restaurants. Only 19 percent have passed laws limiting smoking in bars (**Exhibit 2**).

**Exhibit 2**  
**Summary of Restrictiveness by Setting,**  
**Texas Municipal Smoking Control Ordinances**

Setting	No Coverage		Limited		Mixed		Moderate		100% Smoke-free		All Restricted	
	#	%	#	%	#	%	#	%	#	%	#	%
Municipal Worksites	18	7	98	41	4	2	9	4	112	46	223	93
Private Sector Worksites	141	59	69	29	6	2	10	4	15	6	100	41
Restaurants	108	45	87	36	19	8	8	3	19	8	133	55
Bars-In Restaurants	183	76	33	14	10	4	5	2	10	4	58	24
Bars-Not in Restaurants	195	81	31	13	8	3	2	1	5	2	46	19

*Source: Texas Smoke-Free Ordinance Database, University of Houston Health Network for Evaluation and Training Systems.*

“No Coverage” indicates that there are no restrictions on smoking in this setting, or that the setting is not specifically addressed in the local ordinance.

The “Limited” category indicates that designated smoking areas are allowed or required. “Mixed” indicates either that no smoking is allowed *or* that designated smoking areas are allowed if separately ventilated, but that the ordinance’s coverage is only partial due to exceptions, ambiguities or legal issues. The “Moderate” category denotes either that no smoking is allowed or that designated smoking areas are allowed if separately ventilated. “100% Smoke-free” indicates that no smoking is allowed in a particular setting. The “All Restricted” category is the sum of the “Limited”, “Mixed”, “Moderate”, and “100% Smoke-free” categories.

All of Texas’ 20 largest cities have passed some type of smoking restriction for at least one setting. The first of these cities to place restrictions on smoking was Grand Prairie in 1986, which passed an ordinance restricting smoking in restaurants and bars.

The most comprehensive bans are found in El Paso, which passed its ordinance in 2002; Austin, which passed its ordinance in 2005; and Laredo and Beaumont, both of which passed an ordinance in 2006. Amarillo, Pasadena, and Mesquite have the least coverage and/or the least restrictive smoking ordinances.

Eleven of the state’s 20 largest cities have passed ordinances since 2000; many of these included the most restrictive controls. Houston’s smoking ordinance is rated as one of the least restrictive.

**Exhibit 3** summarizes the restrictiveness of smoking ordinances in Texas' 20 largest cities. The ordinances are rated according to restrictiveness, with 5 being the most restrictive (100% Smoke-free) and 1 being the least restrictive (No Coverage).

**Exhibit 3**  
**Restrictiveness of Smoking Control Ordinances**  
**Texas' 20 Largest Cities**

Municipality	Municipal Worksite	Private Worksite	Restaurant	Bar - Not in Restaurant	Bar - in Restaurant	Population	Minority %	County	Passage Date
Houston	2	2	2	2	2	1,953,631	69.19	Harris	3/9/2005
Dallas	5	2	5	2	5	1,188,580	65.44	Dallas	1/22/2003
San Antonio	5	5	2	2	2	1,144,646	68.17	Bexar	8/7/2003
Austin	5	5	5	5	5	656,562	47.06	Travis	3/3/2005
El Paso	5	5	5	5	5	563,662	81.65	El Paso	1/2/2002
Fort Worth	5	3	3	2	2	534,694	54.19	Tarrant	5/20/1997
Arlington	3	3	2	3	3	332,969	40.36	Tarrant	10/11/2005
Corpus Christi	2	2	5	1	1	277,454	61.47	Nueces	1/11/2005
Plano	1	1	3	3	3	222,030	27.24	Collin	8/28/1995
Garland	5	1	3	1	1	215,768	46.71	Dallas	2/21/2006
Lubbock	4	4	4	1	1	199,564	38.70	Lubbock	7/12/2001
Irving	2	2	3	1	2	191,615	51.75	Dallas	7/17/1997
Laredo	5	5	5	5	5	176,576	94.96	Webb	4/3/2006
Amarillo	1	1	2	1	2	173,627	31.57	Potter	9/19/1989
Pasadena	5	1	1	1	1	141,674	52.76	Harris	2/19/1996
Brownsville	2	2	2	1	1	139,722	92.25	Cameron	1/31/1989
Grand Prairie	1	2	2	2	1	127,427	52.82	Dallas	2/4/1986
Mesquite	2	1	2	1	1	124,523	34.64	Dallas	1/1/1999
Abilene	2	2	2	1	1	115,930	31.24	Taylor	4/23/1987
Beaumont	5	5	5	5	5	113,866	57.32	Jefferson	4/25/2006

\*Note: 100% Smoke-free (5) - No smoking allowed in a particular setting; Moderate (4) - Either no smoking allowed OR designated smoking areas are allowed if separately ventilated; Mixed (3) - Either no smoking is allowed OR designated smoking areas are allowed if separately ventilated, but coverage is partial due to exceptions, ambiguities, or legal issues; Limited (2) - Designated smoking areas allowed or required; No Coverage (1) - No restrictions on smoking. A setting not specifically indicated is scored as "No Coverage."

Source: Texas Smoke-Free Ordinance Database, University of Houston Health Network for Evaluation and Training Systems

### **Economic Studies**

Smoking control ordinances have generated much debate, primarily concerning the economic impact that such restrictions may have on restaurant, bar and hospitality revenues.

Numerous studies have attempted to examine the effect of these ordinances. Many of these studies focus on a single city, while others seek to draw broader conclusions by examining multiple localities as well as previous studies.

Perhaps unsurprisingly, the results of these studies tend to correlate with their funding sources. Studies funded by the tobacco and restaurant industries tend to find that restaurant jobs and sales decline under smoke-free ordinances, while studies conducted by public health agencies or professionals show that such policies do not have a significant effect on restaurant sales.<sup>4</sup>

This divergence may be due to the different study methods employed by the two camps. Tobacco and restaurant industry studies tend to focus on the effects of smoke-free ordinances on individual businesses, relying on survey data.<sup>5</sup> By analyzing such data, these studies can compare the effects on individual restaurants or groups of restaurants and identify whether some are affected more or less than others. In other words, they can identify whether the effects of the ordinances are *uniform* across restaurants, affecting all restaurants the same, or *differential*, affecting various restaurants differently.

Studies performed by public health agencies or professionals, by contrast, tend to focus on aggregate effects, using aggregate sales or employment data. These studies usually examine data on all restaurants lumped together to identify the impact on the sector as a whole. As such, these studies cannot determine whether the effects of an ordinance are uniform or differential, but they *can* determine whether the sector as a whole is affected. Each group has voiced strong criticism of the other's methodology, and no consensus appears to have been reached regarding an appropriate method for capturing both differential effects and aggregate impacts.

**Exhibit 4** summarizes publicly available studies on Texas cities as well as other key studies that have been conducted across the U.S. Note that many of the studies associated with the tobacco or restaurant industry are not published or publicly available, and therefore are not included in the exhibit.

Three of the four studies focusing on Texas cities found no evidence that smoking control ordinances affect restaurant sales. These studies employed statistical modeling to control for exogenous factors and isolate the impact of the ordinance itself. The fourth study examined changes in aggregate sales as well as individual restaurant sales data obtained through a survey. This study found that the smoking control ordinance had negative effects on restaurant sales.

The other key studies included in the exhibit all relied on regression analysis and reached the same conclusion, that smoking control ordinances have no economic impact on restaurant sales. The Dunham and Marlow study, however, concluded that bars and taverns are more likely to be adversely affected by smoking laws than restaurants, highlighting the existence of differential effects among various types of establishments.

The exhibit demonstrates that differing methodologies produce seemingly conflicting results. It should be noted, however, that individual restaurant revenues may be affected in different ways – some positively and some negatively – while aggregate revenues remain unchanged. To address this issue, aggregated and disaggregated revenues can be examined to identify whether certain groups of establishments are affected more or less than other groups.

**Exhibit 4**  
**Summary of Key Studies**

Locality(ies) Studied (Report Date)	Author	Affiliation / Sponsor	Methodology	Results / Conclusions
<i>Texas Cities:</i>				
West Lake Hills, (1995)	Huang, P Tobias, S Kohout, S Harris, M Saterwhite, D Simpson, D Winn, L Foehner, J Pedro, L	Centers for Disease Control	Used linear regression model to estimate the effect of smoking ordinance on aggregate restaurant sales, controlling for seasonal and temporal economic trends.	Total sales of the restaurants did not decrease after implementation of the ordinance.
Arlington Austin Plano Wichita Falls (2000)	Hayslett, J Huang, P	Texas Department of Health	Used linear regression model to estimate the effect of smoking ordinance on aggregate restaurant sales, controlling for seasonal and temporal economic trends.	Total sales showed no evidence of decreasing with the implementation of clean indoor air ordinances in any of the four cities reviewed.
El Paso (2004)	Huang, P McCusker, M	Centers for Disease Control	Used linear regression model to estimate the effect of smoking ordinance on aggregate restaurant sales and mixed-beverage sales tax receipts, controlling for seasonal and temporal economic trends.	Total sales and mixed beverage sales were not affected by the smoking ban.
Dallas (2004)	Clower, T L Weinstein, B L	Greater Dallas Restaurant Association	Evaluated alcoholic beverage sales data, reviewed a survey of the Greater Dallas Restaurant Association membership and analyzed information obtained from press reports.	Alcohol sales in Dallas eating and drinking establishments fell between 2002 and 2003, while sales in surrounding areas increased. Self- reported survey data found that restaurant sales declined.

## Exhibit 4 (continued)

Locality(ies) Studied (Report Date)	Author	Journal / Affiliation	Methodology	Results / Conclusions
<i>Other Key Reports:</i>				
15 Cities in Colorado and California (1997)	Glantz, S Smith, L	<i>American Journal of Public Health</i>	Used linear regression analysis to estimate the effect of smoking ordinance on restaurant and bar revenues, controlling for seasonal and temporal economic trends. Included a comparison group of cities that did not have smoking ordinances.	Smoke-free ordinances do not affect restaurant or bar revenue.
New York State: Suffolk New York City Westchester Erie Monroe (2003)	Hyland, A Puli, V Cummings, M Sciandra, R	<i>Cornell Hotel and Restaurant Administration Quarterly</i>	Used regression analysis to estimate the effect of smoking ordinance on revenues and employment, controlling for seasonal, secular and economic trends. Included a comparison group of counties that did not have smoking ordinances.	Smoke-free regulations were not associated with adverse economic outcomes in restaurants.
293 municipalities in Massachusetts (2002)	Bartosch, W Pope, G	<i>Tobacco Control</i>	Used regression analysis to estimate the effect of smoking ordinance on meal and alcohol sales, controlling for seasonal, secular and economic trends. Included a comparison group of counties that did not have smoking ordinances.	Highly restrictive restaurant smoking policies do not have a significant effect on a community's level of meal receipts.
Nationwide (2000)	Dunham, J Marlow, M	<i>Contemporary Economic Policy</i> , Philip Morris	Used a survey of 1,300 owners/ managers of restaurants and bars across the U.S. to analyze expectations of effect of smoking restrictions on bars and restaurants.	A subset of restaurants and the majority of bars and taverns are likely to suffer adverse effects from smoking laws. More importantly, not all establishments are affected to the same degree, confirming the existence of differential effects.

## METHODS

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MGT developed a method to examine both the aggregate and differential effects of Houston's and Dallas' smoking ordinance. In this way, the present study attempts to address the concerns of both supporters and opponents.

To understand the context in which these ordinances were implemented, MGT examined and compared the historical performance of the restaurant sectors in both Houston and Dallas.

MGT then used a statistical analysis to examine the relationship between the smoking ordinances and restaurant and mixed beverage sales. To yield comparable results, we chose to use a method similar to that employed in other quantitative studies. Our economic outcome indicator is per-outlet sales, both restaurant sales per outlet and mixed beverage sales per outlet.

To examine differential effects, sales data were analyzed by type of establishment, as defined by Standard Industrial Classification (SIC) codes or North American Industry Classification System (NAICS) codes.

In the analysis, sales tax data for Eating Places (SIC 5812), which are restaurants that do not sell alcohol, were analyzed separately from Eating and Drinking Places, which are restaurants that sell beer and wine (SIC 5816) and restaurants that sell alcoholic beverages (SIC 5817).

In the analysis of mixed beverage tax data, we analyzed Full-Service Restaurants (NAICS 722110), which are establishments primarily engaged in providing food services to patrons who order and are served while seated, separately from Drinking Places (NAICS 722410), which are establishments primarily engaged in preparing and serving alcoholic beverages for immediate consumption.

In addition, we identified indicators to control for secular, economic and seasonal trends. Secular trends are general long-term trends not tied to the economy (such as the increasing popularity of eating out), while economic trends are specifically tied to the economy. Seasonal trends are associated with regular cycles that occur over the course of a particular time period—in this case, a year. (Examples of seasonal trends would include retail sales driven by Christmas.)

The following data were used to construct the dataset used in this analysis:

- quarterly taxable sales data for the SIC codes corresponding to Eating Places (5812) as well as Eating and Drinking Places (5816 and 5817) in Houston and Dallas, from 1993 through fourth quarter 2005 (Source: Texas Comptroller of Public Accounts).

- quarterly gross mixed beverage sales for NAICS codes corresponding to Full-Service Restaurants (722110) and Drinking Places (722410) in Houston and Dallas, from 1994 through first quarter 2006 (Source: Texas Comptroller of Public Accounts).
- the Consumer Price Index for the Houston and Dallas metropolitan statistical areas (MSAs) from 1993 through the first quarter of 2006 (Source: Bureau of Labor Statistics).
- the Business Cycle Index (BCI) for the Houston and Dallas MSAs from 1993 through first quarter 2006 (Source: Federal Reserve Bank, Dallas). The BCI is a coincident index (that is, an index that varies directly with, and at the same time as, related economic trends) constructed from unemployment data, nonfarm employment and the real gross state product.<sup>6</sup>

Because sales tax data were available only up to the fourth quarter of 2005, only one quarter of data was available to analyze the impact of the smoking ordinance on Houston's restaurant sales. This limitation prohibited the use of regression analysis.

Instead, we used the Holt-Winters adaptive forecasting technique, a time-series method used to predict trend behavior. Such forecasts assume that future performance will follow the same pattern as past performance. The Holt-Winters method employed here includes a seasonal component to account for the strong seasonality of restaurant sales.

By forecasting a trend from past performance and comparing the Holt-Winters forecast to actual results after the implementation of a smoking ordinance, we can extrapolate the potential effects of the ordinance on restaurant sales.

For Houston mixed beverage gross sales, as well as Dallas restaurant taxable and mixed beverage gross sales, we analyzed the data using a multivariate (that is, involving multiple variables) regression analysis. The following model was used to estimate the impact of the smoking ordinance:

$$Y = \beta_0 + \beta_1(Tm) + \beta_2(Q1) + \beta_3(Q2) + \beta_4(Q3) + \beta_5(BCI) + \beta_6(Ord) + \varepsilon$$

where:

Y = Local taxable restaurant sales per outlet in constant 2006 dollars, or local gross mixed beverage sales per outlet in constant 2006 dollars.

Tm = the time period in which the observation was taken.

Q1 = 1 if the observation was in the first quarter and 0 if otherwise.

Q2 = 1 if the observation was in the second quarter and 0 if otherwise.

Q3 = 1 if the observation was in the third quarter and 0 if otherwise.

BCI = Business Cycle Index for the appropriate MSA and time period.

Ord = 1 if the smoking ordinance was in effect and 0 if otherwise.

The model employed per-outlet sales figures as a control for sales growth through city annexations as well as restaurant openings and closings. We used real (inflation-adjusted) sales rather than nominal sales to control for inflation; all sales figures were inflated to 2006 constant dollars.

A time variable was included as a continuous variable to control for secular, or long-term, trends. In addition, we constructed variables to represent each quarter, to control for seasonal changes. Finally, to control for economic trends, we incorporated the Business Cycle Index for the Houston and Dallas MSAs into the model. The BCI was used because it more accurately reflects the movement of the Texas economy than employment or production data alone.

To measure the effect of the smoking ordinance, we constructed a variable that took a value of 1 in quarters in which the ordinance was in place and a value of 0 when the ordinance was not in place. Both Houston and Dallas implemented their ordinances in the third month of a quarter, but these quarters were assumed to be entirely pre-ordinance due to implementation delays.

We analyzed restaurant sales data for Dallas for all three applicable SIC codes in aggregate, and then ran separate models for Eating Places (SIC 5812) and for Eating and Drinking Places (SIC 5816 and 5817). We did not analyze restaurant sales data for Houston in this manner due to the data limitations discussed above. We then analyzed mixed beverage sales for Houston and for Dallas separately for Full-Service Restaurants (NAICS 722110) and Drinking Places (NAICS 722410). We ran these separate models to enable us to determine whether the smoking ordinance had differential effects on Eating Places versus Eating and Drinking Places, and Full-Service Restaurants versus Drinking Places.

To account for serial correlation (the correlation of successive values in a time series) present in the models, we calculated Newey-West standard errors, which correct for the downward bias in unadjusted standard errors.

The results of MGT's analysis are presented in the following chapter.

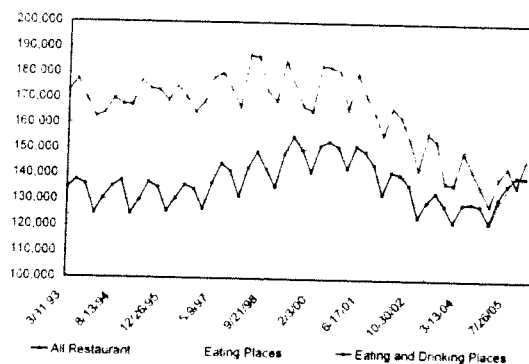
## RESULTS AND CONCLUSIONS

### *Performance of Dallas' and Houston's Restaurant Sectors*

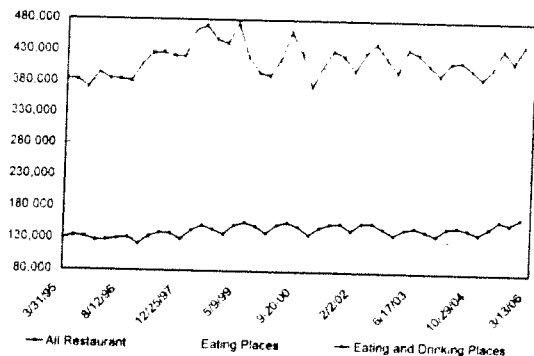
The charts of restaurant and mixed beverage sales per outlet show strong seasonality. In both cities, the first and second quarter restaurant sales figures are generally higher than the third and fourth quarters, and the fourth and first quarter mixed beverage sales are generally higher than second and third quarter figures. This seasonality creates the ups and downs apparent in **Exhibits 5** through **8**. We controlled for this seasonality with variables representing the quarters in which the observations were taken.

In terms of restaurant sales per outlet, Dallas' and Houston's restaurant sector responded differently to the economic recession of the early 2000s. While Dallas' restaurant sales declined significantly, and were still declining when the smoking ordinance was put into place (**Exhibit 5**), Houston's restaurant sales per outlet remained quite stable (**Exhibit 6**).

**Exhibit 5**  
**Dallas Restaurant Sales per Outlet**  
**By Restaurant Type**  
**in Constant 2006 Dollars**



**Exhibit 6**  
**Houston Restaurant Sales per Outlet**  
**By Restaurant Type**  
**in Constant 2006 Dollars**

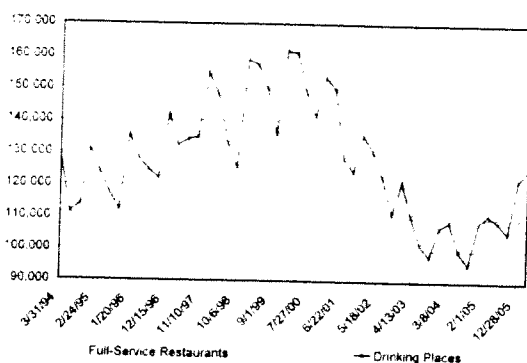


In terms of mixed beverage sales per outlet, Dallas' Drinking Places showed much more sensitivity to the recession (**Exhibit 7**) than Houston's (**Exhibit 8**). Full-service restaurants, on the other hand, remained relatively stable in both cities.

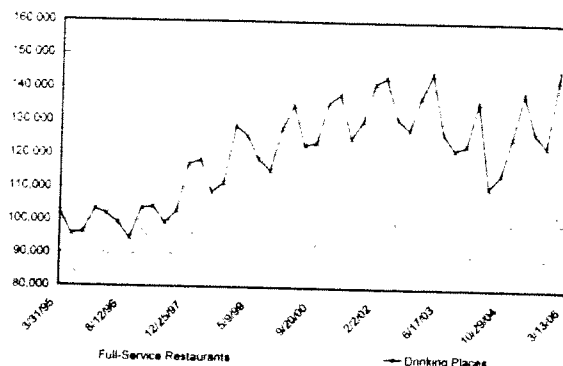
To control for the sensitivity of the restaurant sectors to the economy and business cycles, we included the Business Cycle Index in our models.

Additional information on the performance of the restaurant sectors in Houston and Dallas may be found in **Appendix A**.

**Exhibit 7**  
Dallas Mixed Beverage Sales per Outlet  
By Outlet Type  
in Constant 2006 Dollars



**Exhibit 8**  
Houston Mixed Beverage Sales per Outlet  
By Outlet Type  
in Constant 2006 Dollars



### ***Economic Impact of the Dallas Smoking Ordinance***

The City of Dallas' smoking ordinance went into effect in March 2003, as denoted by the dotted vertical line on **Exhibits 5** and **7**. To analyze the effect of the ordinance on Dallas restaurants, MGT created separate models to examine the relationship between the ordinance and per-outlet sales both for total restaurant sales and mixed beverage sales. Furthermore, these two categories of sales were analyzed by establishment type. These separate models allowed for the identification of differential effects among the types of establishments.

**Exhibit 9** summarizes the results of this analysis. Coefficient estimates are on the top line, with associated p-values beneath. At the 95 percent confidence level, a p-value of less than 0.05 is significant and greater than 0.05 is insignificant. Additional information may be found in **Appendix B**.

The ordinance was not associated with adverse effects on total per-outlet restaurant sales, either in aggregate or by type. It was associated with minor increases in per-outlet sales for all restaurants and for Eating Places, and with minor decreases in per-outlet sales for Eating and Drinking Places. These outcomes, however, were statistically insignificant at the 95 percent confidence level.

For mixed beverage sales, the smoking ordinance was associated with a statistically significant decrease in per-outlet sales for Full-Service Restaurants and a statistically insignificant increase in per outlet sales for Drinking Places.

## Results and Conclusions

These results indicate that the smoking ordinance did have differential effects. While the effects on Eating Places and Eating and Drinking Places were insignificant, *Full-Service Restaurants' mixed beverage sales were negatively affected by the smoking ban.*

**Exhibit 9**  
**Dallas Restaurant and Mixed Beverage Sales**  
**Trend Analysis**

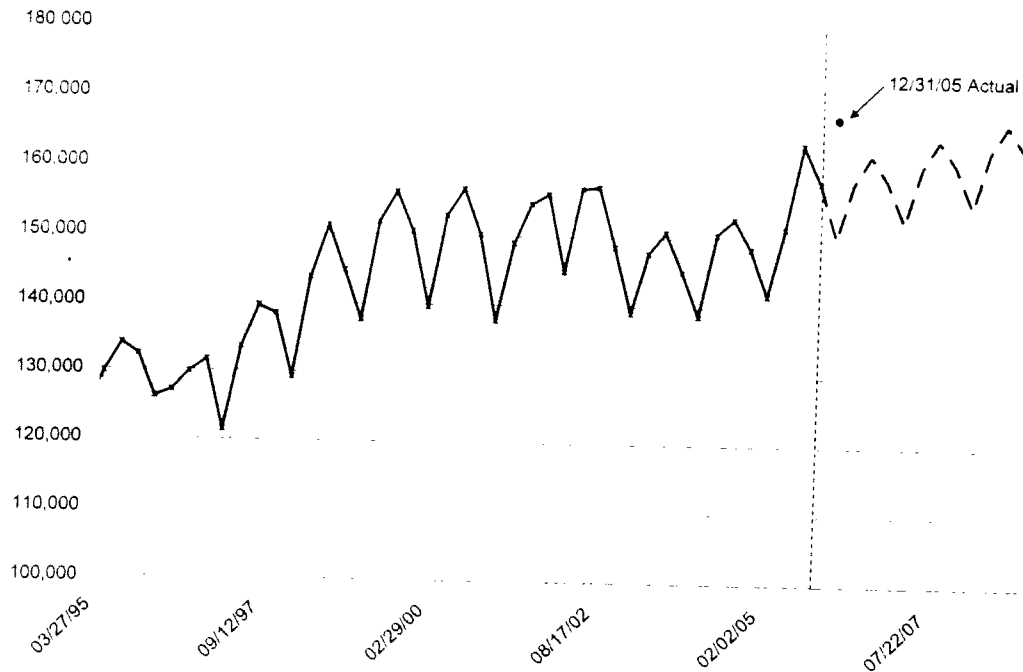
	Constant	Time	Q1	Q2	Q3	BCI	Ord
Restaurant Sales							
All Restaurants	66,822.68	-325.70	3,970.84	5,800.87	4,513.57	295.02	1,739.51
	0.000	0.000	0.000	0.000	0.000	0.000	0.146
	Adj. R <sup>2</sup> = 0.838						
Eating Places (SIC 5812)	99,896.96	-508.32	6,514.53	11,229.28	9,983.74	575.60	5,424.73
	0.000	0.000	0.000	0.000	0.000	0.000	0.064
	Adj. R <sup>2</sup> = 0.808						
Eating and Drinking Places (SIC 5816, 5817)	246,661.90	-1,284.36	11,143.59	10,064.27	3,524.66	645.60	-2,038.81
	0.000	0.000	0.000	0.000	0.044	0.000	0.215
	Adj. R <sup>2</sup> = 0.910						
Mixed Beverage Sales							
Full-Service Restaurants (NAICS 722110)	57,647.01	285.71	-1,392.02	-4,319.52	-8,910.24	64.01	-9,061.34
	0.000	0.081	0.267	0.000	0.000	0.534	0.013
	Adj. R <sup>2</sup> = 0.529						
Drinking Places (NAICS 722410)	182,805.00	-1,629.69	-3,092.96	-13,241.06	-17,917.88	1,176.71	5,863.49
	0.000	0.000	0.092	0.000	0.000	0.000	0.080
	Adj. R <sup>2</sup> = 0.908						

### *Economic Impact of the Houston Smoking Ordinance*

The City of Houston implemented its smoking control ordinance in September 2005, as denoted by the dotted line in **Exhibits 6 and 8**. Because of the unavailability of 2006 data on restaurant sales, we were unable to estimate the impact of Houston's smoking ordinance on restaurant sales using multivariate regression analysis.

Instead, we opted to use the seasonal Holt-Winters method to model restaurant sales, projecting them to the fourth quarter of 2008. Comparing *actual* restaurant sales for fourth quarter 2005 to the projections implies that actual sales were higher than they might have been otherwise (**Exhibit 10**).

**Exhibit 10**  
**Houston Restaurant Sales per Outlet in 2006 Constant Dollars**  
**All Restaurants (SIC 5812, 5816, 5817)**  
**Holt-Winters Forecast**



Mixed beverage sales were available for the first quarter of 2006, and so we were able to use multivariate regression analysis to analyze the impact of the ordinance on these sales.

**Exhibit 11** summarizes the results of this analysis. Coefficient estimates are displayed on the top line with associated p-values beneath. Additional information may be found in **Appendix B**.

In both models, the smoking ordinance has a positive but insignificant relationship with mixed beverage sales. Note that the ordinance coefficient for the Drinking Places model is of a higher magnitude, implying that the presence of the smoking ordinance was associated with a greater increase in per-outlet sales for Drinking Places than for Full-Service Restaurants.

**Exhibit 11**  
**Houston Mixed Beverage Sales**  
**Trend Analysis**

	Constant	Time	Q1	Q2	Q3	BCI	Ord
Full-Service Restaurants (NAICS 722110)	90,750.06 0.000	-154.49 0.157	-2,995.34 0.001	-4,141.12 0.000	-8,206.65 0.000	166.87 0.016	1,299.72 0.233
	Adj. R <sup>2</sup> = 0.718						
Drinking Places (NAICS 722410)	108,984.90 0.000	-1,299.30 0.001	3,725.85 0.063	-8,567.19 0.000	-9,891.79 0.000	1,183.43 0.000	3,249.61 0.282
	Adj. R <sup>2</sup> = 0.900						

### *Conclusions*

The analyses of per-outlet restaurant sales in Houston and Dallas indicate that smoking ordinances do not appear to carry adverse outcomes for the restaurant sector in aggregate. Although the smoking ordinance in Dallas is associated with less favorable sales for Eating and Drinking Establishments than for Eating Establishments, the effect is statistically insignificant.

The analysis of per-outlet mixed beverage sales indicates that, in Dallas, the ordinance is associated with declines in mixed beverage sales in Full-Service Restaurants. This trend, however, does not appear to be replicated in Houston.

The results of our analysis on restaurant sales in aggregate are consistent with earlier quantitative studies performed on other Texas cities. Analyzing sales by restaurant type, however, does indicate that smoking ordinances may not have a uniform effect on all types of restaurants.

<sup>1</sup> "Overview List – How Many Smoke-free Laws?" American Nonsmokers' Rights Foundation, July 1, 2006. Available online in pdf format at <http://www.no-smoke.org/pdf/mediaordlist.pdf>.

<sup>2</sup> "Overview List – How Many Smoke-free Laws?"

<sup>3</sup> Municipalities selected for the study include incorporated municipalities with more than 5,000 residents; all municipalities in the East Texas Pilot Study of 2000 – 2002, sponsored by the Texas Tobacco Prevention Initiative of the Texas Department of State Health Services; municipalities of fewer than 5,000 residents with identified second-hand smoke ordinances; and a representation of each county with at least one municipality.

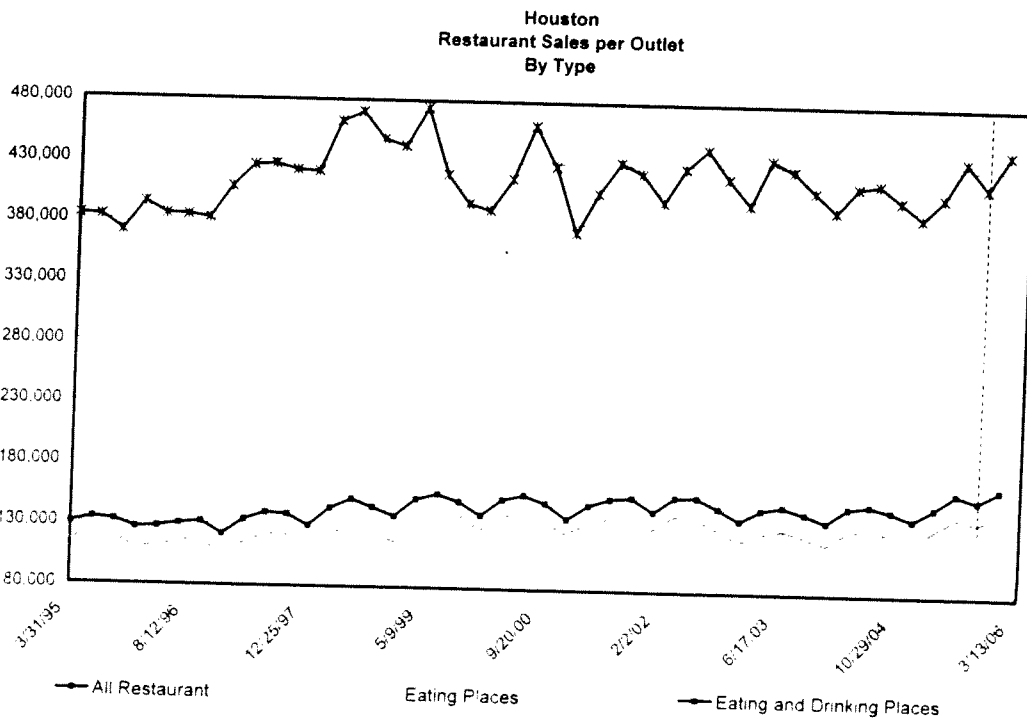
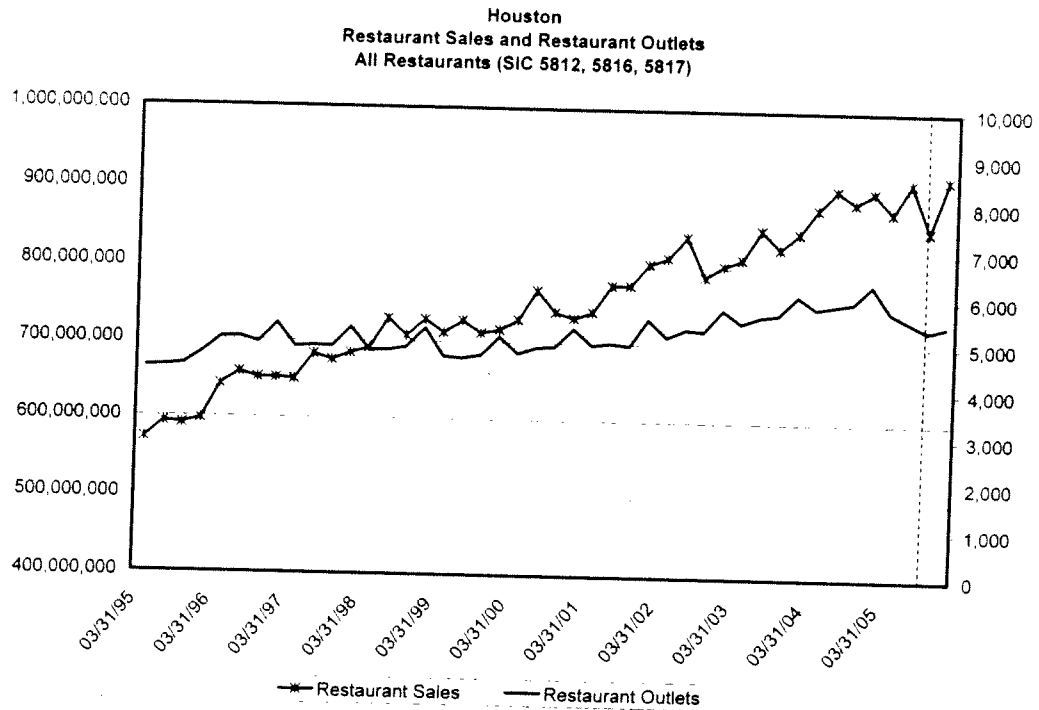
<sup>4</sup> Bartosch, W., and G.C. Pope, "Economic Effect of Restaurant Smoking Restrictions on Restaurant Business in Massachusetts, 1992 to 1998," *Tobacco Control*, 2002, 11:38-42; and Scollo, Michelle, A. Lal, A. Hyland and S. Glantz, "Review of the Quality of Studies on the Economic Effects of Smoke-Free Policies on the Hospitality Industry," *Tobacco Control*, 2003, 12:13-20.

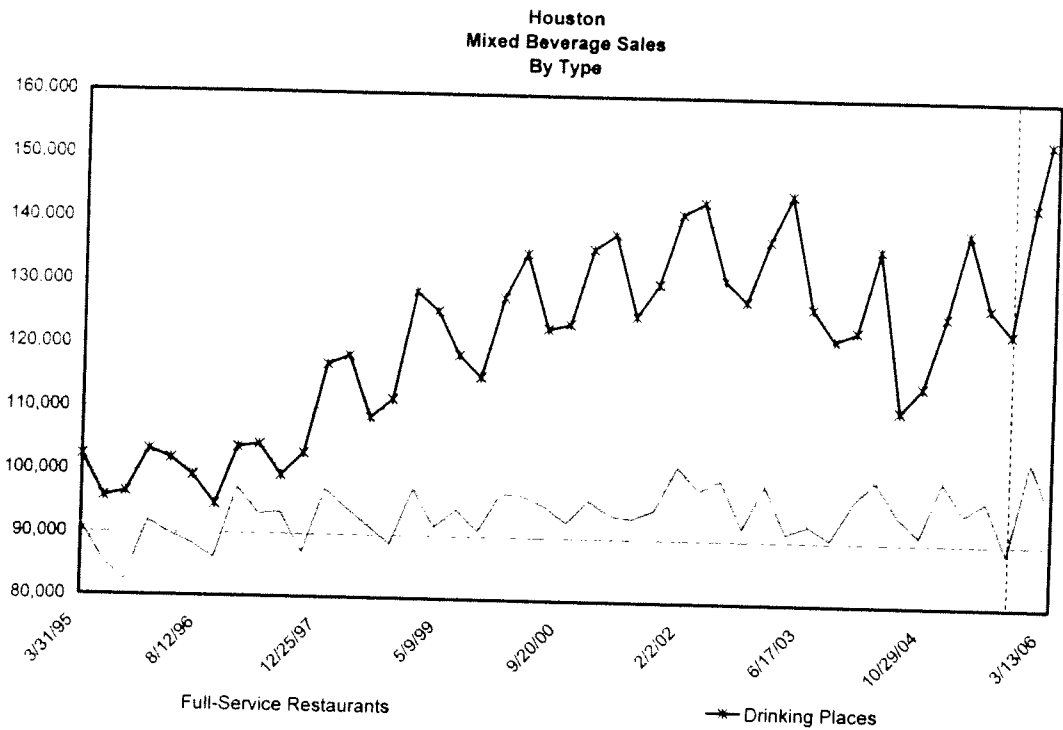
<sup>5</sup> Dunham, J and M Marlow, "Smoking Laws and Their Differential Effects on Restaurants, Bars, and Taverns," *Contemporary Economic Policy*, 2000, 18: 326-333; and Clower, T., and B. Weinstein, "A Report on the Impacts of the City of Dallas Smoking Ban on Alcoholic Beverage Sales, March 2003 to March 2004." Prepared for the Greater Dallas Restaurant Association, 2004.

<sup>6</sup> Phillips, Keith R. "A New Monthly Index of the Texas Business Cycle." Federal Reserve Bank of Dallas, working Paper 0401, Jan 2004.

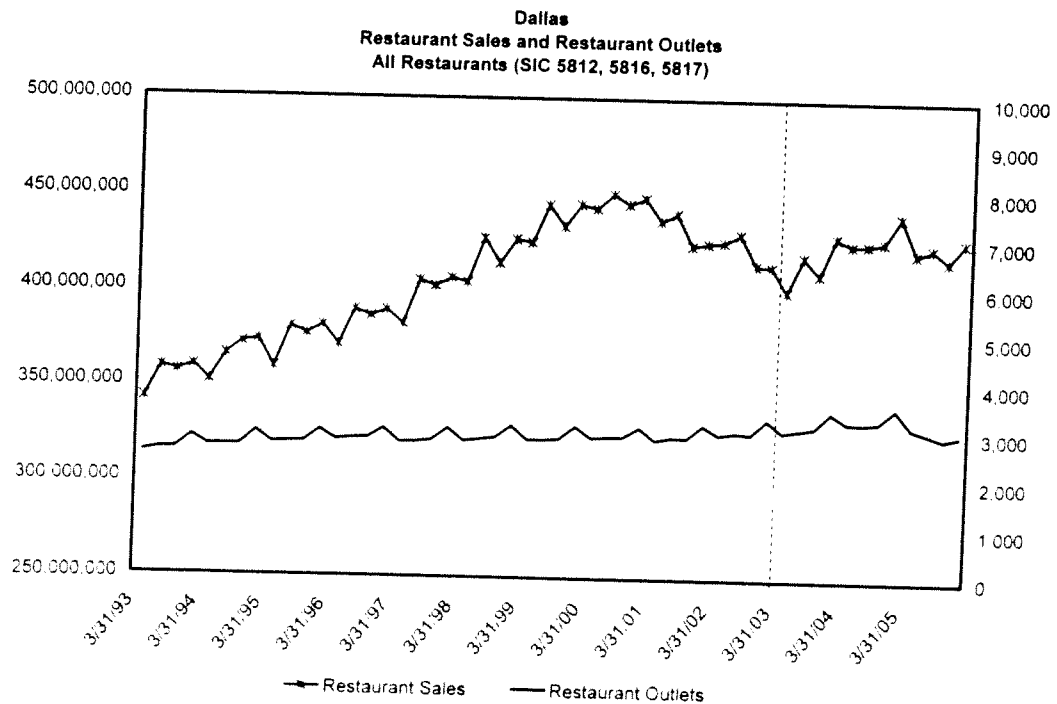
# APPENDIX A: HISTORIC PERFORMANCE

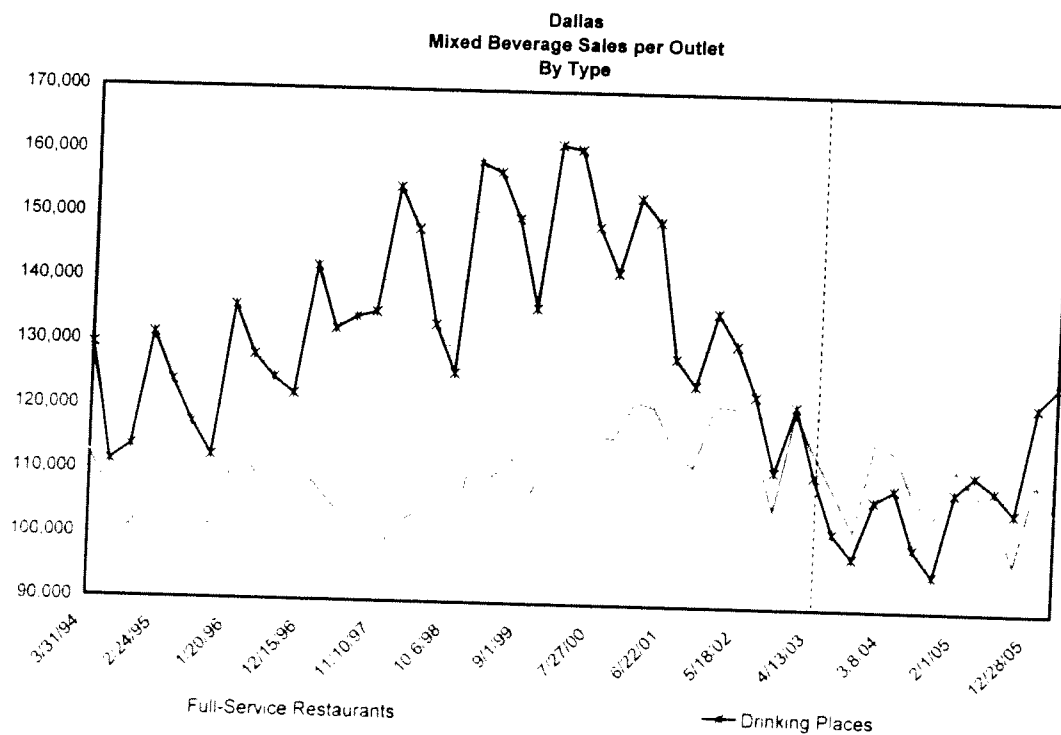
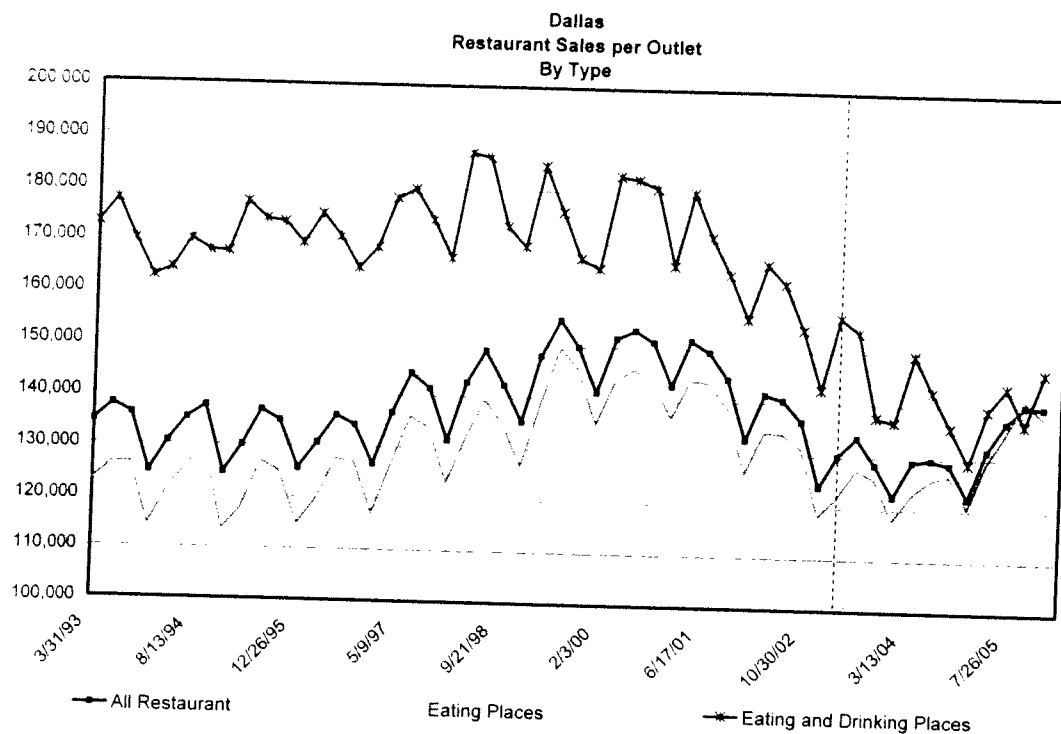
## Houston Restaurant Sector Performance





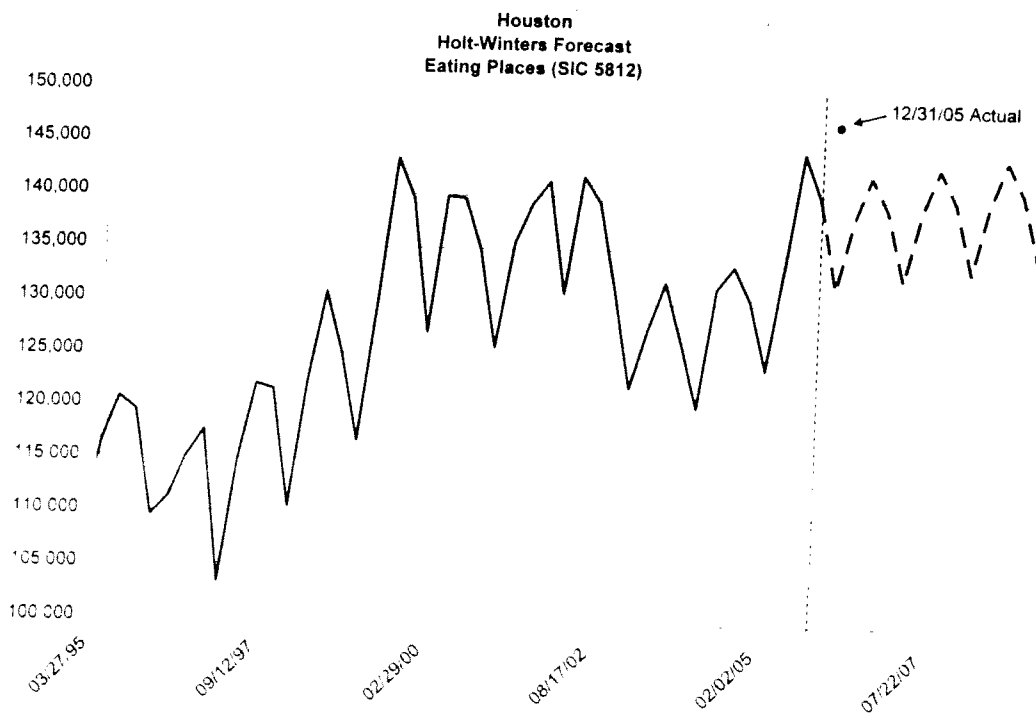
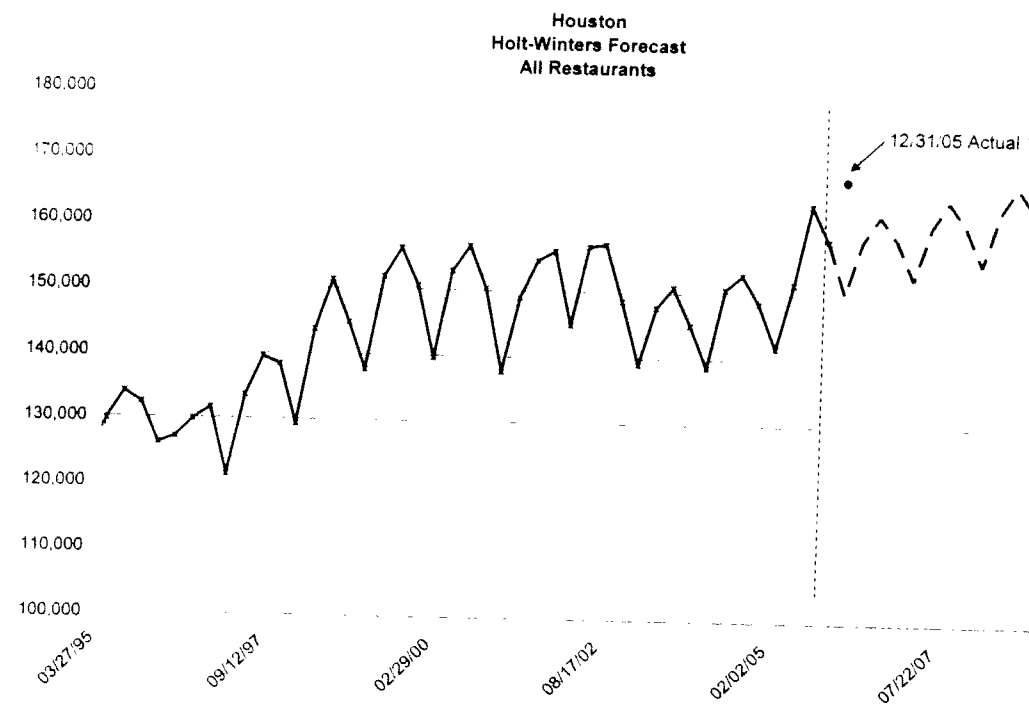
### *Dallas Restaurant Sector Performance*

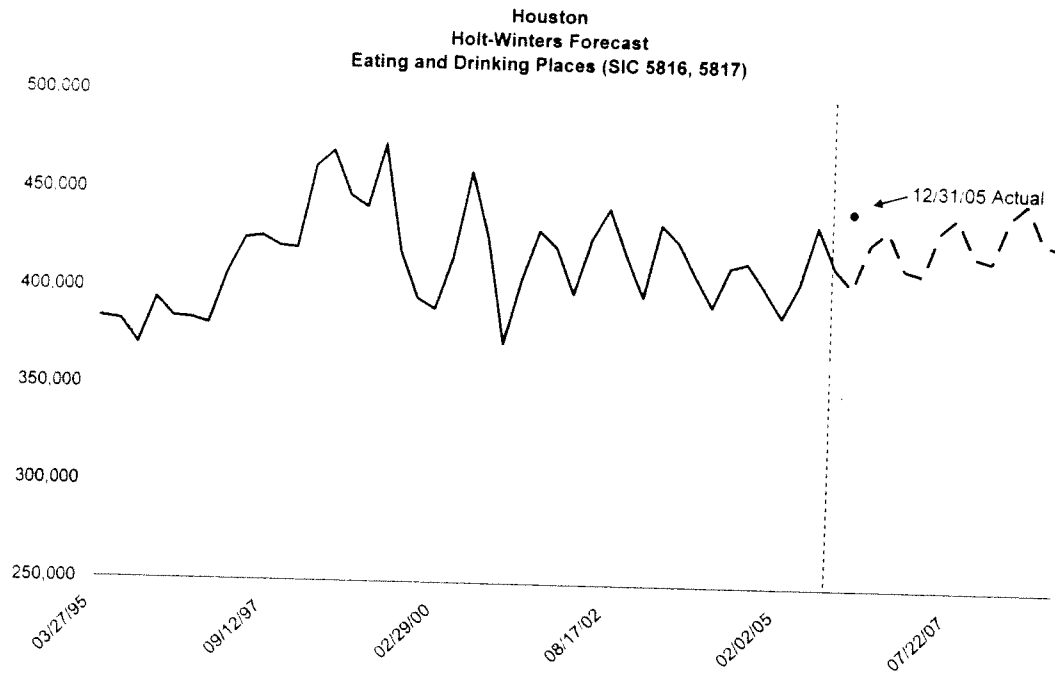




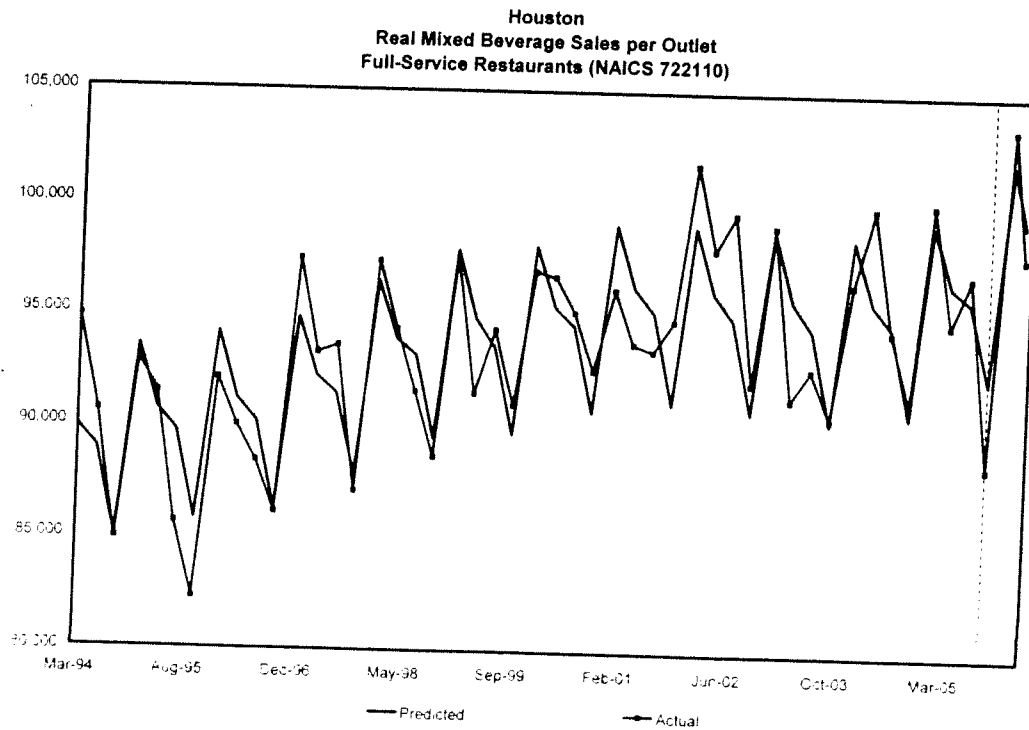
## APPENDIX B: ANALYSIS OF SALES

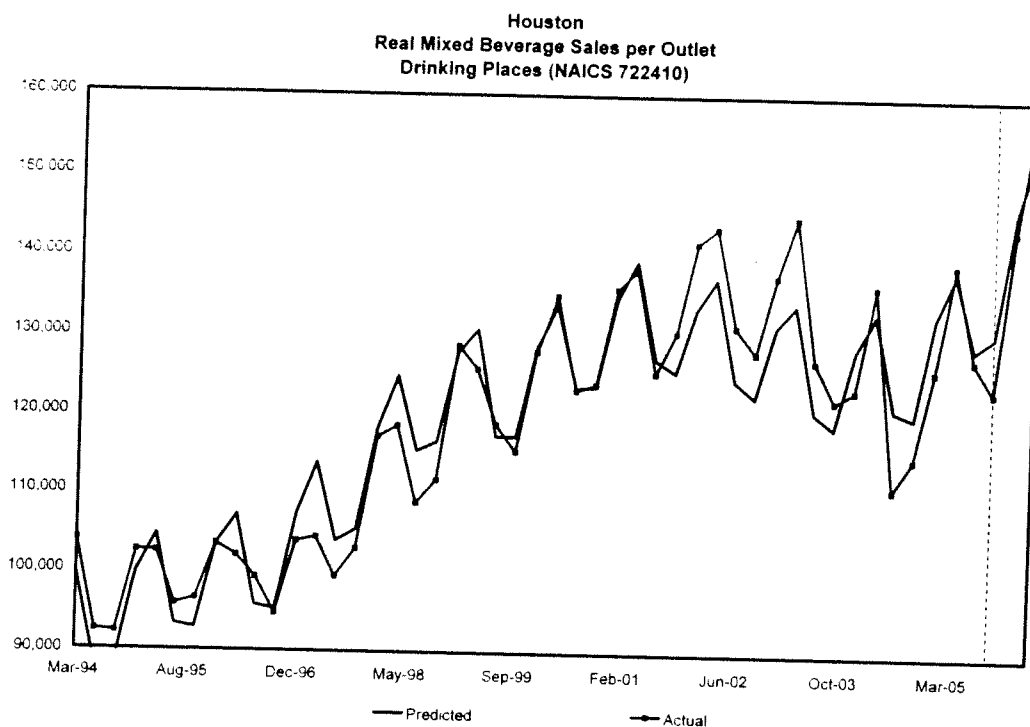
### *Houston Restaurant Sales*



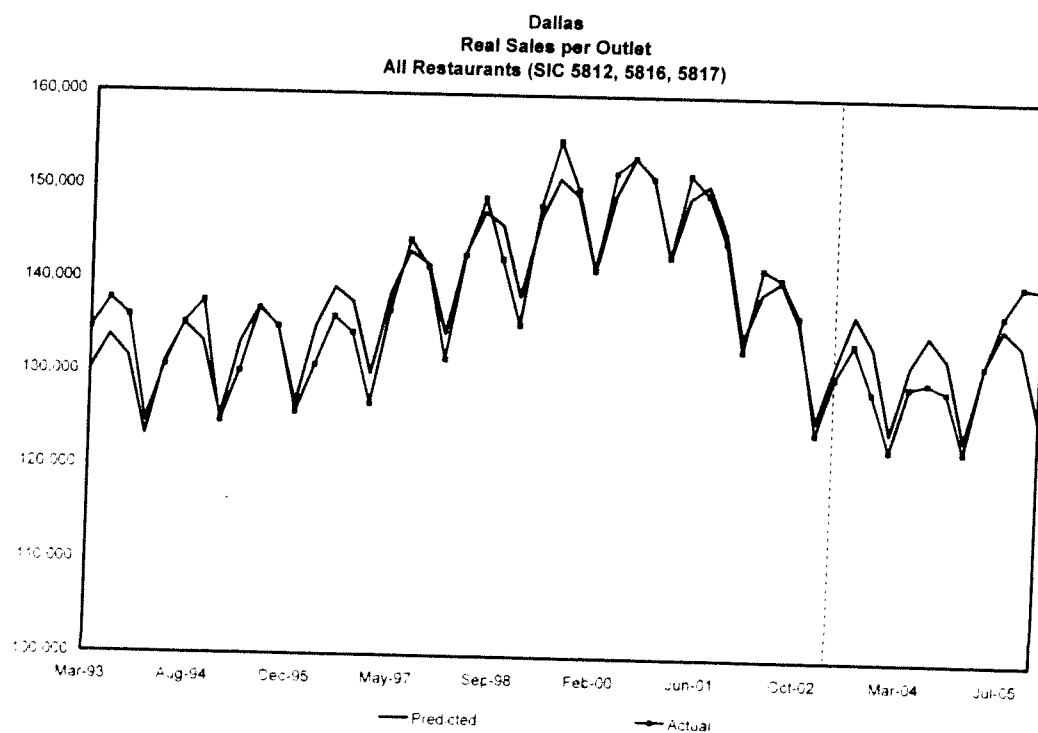


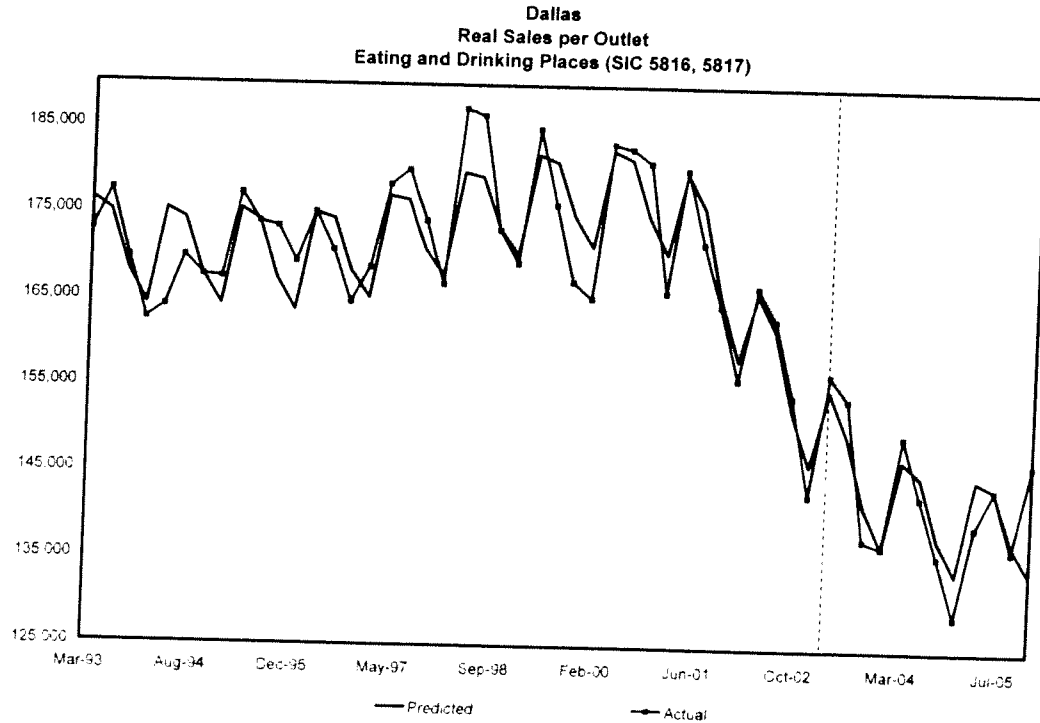
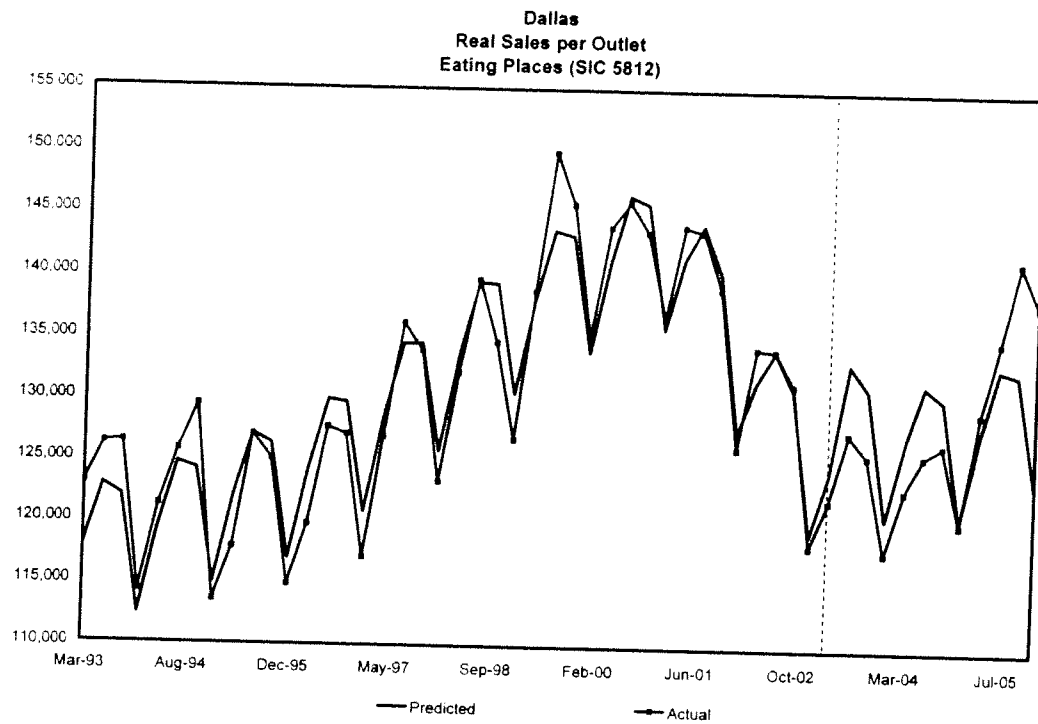
### *Houston Mixed Beverage Sales*





### *Dallas Restaurant Sales*





**Dallas Mixed Beverage Sales**